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WHAT IS CLAIMED IS:

1. A method for the preparation of simvastatin comprising a method as set forth in Figure 5, Figure 6A or Figure 38.

2. A method for the preparation of simvastatin comprising a method having the following steps:

(a) enzymatic hydrolysis of lovastatin, lovastatin acid or a salt of lovastatin acid to form a triol acid or a salt of a triol acid;

(b) lactonization and acylation of the triol acid to form a 4-acetyl lactone, wherein the acylation comprises protecting a 4-position hydroxyl (4'-OH) on the lactone ring by regioselective acylation of the 4'-OH;

(c) enzymatic acylation of an 8-position hydroxyl (8'-OH) of the 4-acetyl lactone to form a 4-acetyl simvastatin; and

(d) removing selectively the acyl protecting group at the 4' position either chemically or enzymatically, thereby yielding simvastatin.

3. The method of claim 2, wherein in step (b) the acylation comprises protecting a 4-position hydroxyl (4'-OH) on the lactone ring by enzymatic regioselective acylation of the 4'-OH.

4. The method of claim 2, wherein in step (c) the enzymatic acylation of an 8-position hydroxyl (8'-OH) of the 4-acetyl lactone enzymatic regioselective acylation of the 8-position to form a 4-acetyl simvastatin

5. A homodiacylation process for the preparation of simvastatin comprising a method having the following steps:

(a) enzymatic hydrolysis of lovastatin, lovastatin acid or a salt of lovastatin acid to form a triol acid;

(b) forming a diol lactone from the triol acid by lactonization;

(c) acylating the 4-position (4'-OH) and 8-position (8'-OH) on the lactone ring of the diol lactone by chemical acylation to form a 4,8-diacetyl lactone; and

(d) removing selectively the acyl group at the 4' position by enzymatic hydrolysis, thereby making simvastatin.

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6. The method of claim 1, claim 2 or claim 5, wherein at least one step is performed in a separate reaction vessel.

7. The method of claim 1, wherein at least two steps are performed in separate reaction vessels.

8. The method of claim 1, claim 2 or claim 5, wherein at least one step is performed with a cell extract.

9. The method of claim 1, claim 2, claim 2 or claim 5, wherein at least one step is performed in a whole cell.

10. The method of claim 1, claim 2 or claim 5, further comprising crystallization of the simvastatin.

11. The method of claim 10, further comprising re-crystallization of the simvastatin.

12. The method of claim 1, claim 2 or claim 5, further comprising re-lactonization to provide simvastatin with a desired purity.

13. The method of claim 1, claim 2 or claim 5, wherein at least one enzymatic reaction is carried out by a hydrolase encoded by a nucleic acid having at least 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more, or complete (100%) sequence identity to SEQ ID NO:1, or enzymatically active fragments thereof..

14. The method of claim 1, claim 2 or claim 5, wherein at least one enzymatic reaction is carried out by a hydrolase encoded by a nucleic acid having at least 53%, 54%, 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or

more, or complete (100%) sequence identity to SEQ ID NO:3, or enzymatically active fragments thereof..

15. The method of claim 1, claim 2 or claim 5, wherein at least one enzymatic reaction is carried out by a hydrolase encoded by a nucleic acid having at least 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more, or complete (100%) sequence identity to SEQ ID NO:5, or enzymatically active fragments thereof..

16. The method of claim 1, claim 2 or claim 5, wherein at least one enzymatic reaction is carried out by a hydrolase having a sequence at least about 50%, 51%, 52%, 53%, 54%, 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more, or complete (100%) sequence identity to SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6, or enzymatically active fragments thereof.

17. The method of claim 1, claim 2 or claim 5, wherein the method comprises enzymatic hydrolysis of lovastatin to make a triol acid or a salt of a triol acid, followed by lactonization of the triol acid and enzymatic acylation of the 4-position (4'-OH) of the lactone ring to make a 4-acyl lactone, followed by enzymatic acylation of the 4-acyl lactone to make a 4-acetyl-simvastatin, followed by regioselective enzymatic hydrolysis of the 4-acetyl-simvastatin to make simvastatin.

18. A method for preparing 4-acetyl lactone comprising enzymatic hydrolysis of lovastatin to make a triol acid or a salt of a triol acid, followed by lactonization of the triol acid to make a diol lactone, followed by regioselective enzymatic acylation of the diol lactone on the 4-position (4'-OH) of the lactone ring to make 4-acetyl lactone.

19. A method for preparing 4-acetyl-simvastatin comprising enzymatic hydrolysis of lovastatin to make a triol acid or a salt of a triol acid, followed by lactonization of the triol acid to make a diol lactone, followed by regioselective enzymatic

acylation of the diol lactone on the 4-position (4'-OH) of the lactone ring to make 4-acetyl lactone, followed by regioselective enzymatic acylation of the 4-acetyl lactone on the 8-position (8'-OH) of the lactone make 4-acetyl-simvastatin.

20. A method for the preparation of a triol acid or a salt of a triol acid from lovastatin comprising:

(a) providing a lovastatin, lovastatin or a salt of lovastatin, and an esterase enzyme;

(b) contacting the lovastatin, lovastatin or a salt of lovastatin with the esterase under conditions wherein the esterase catalyzes the hydrolysis of the lovastatin to a triol acid or a salt of a triol acid.

21. The method of claim 20, wherein the esterase has a sequence at least about 50%, 51%, 52%, 53%, 54%, 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more, or complete (100%) sequence identity to SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6.

22. A method for preparing a triol acid or a salt of a triol acid from a lovastatin comprising a method as set forth in Figure 15A, Figure 16A, Figure 18E or Figure 19.

23. A method for preparing a triol acid from lovastatin acid comprising a method as set forth in Figure 16A.

24. A method for preparing a lovastatin acid from a lovastatin comprising a method as set forth in Figure 16A.

25. A method for preparing a diol lactone from a triol acid comprising a method as set forth in Figure 8.

26. A method for preparing an acyl lactone from a diol lactone comprising a method as set forth in Figure 16C.

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27. A method for preparing an acyl lactone from a triol acid comprising a method as set forth in Figure 16D.

28. A method for preparing a 4-acetyllactone from a triol acid comprising a method as set forth in Figure 9A.

29. A method for preparing an acyl simvastatin from an acyl lactone comprising a method as set forth in Figure 16E.

30. A method for preparing a 4-acetylsimvastatin from a 4-acetyllactone comprising a method as set forth in Figure 9B.

31. A method for preparing a simvastatin from a 4-acetylsimvastatin comprising a method as set forth in Figure 9C or Figure 11.

32. A method for preparing a simvastatin ammonium salt from an acyl simvastatin comprising a method as set forth in Figure 16F.

33. A method for preparing a simvastatin from a simvastatin ammonium salt comprising a method as set forth in Figure 16F.

34. A method for preparing a simvastatin or related compound from lovastatin, a triol acid, a 4-acyl lactone or a 4-acyl simvastatin, comprising a method as set forth in Figure 5, Figure 6A or Figure 38, wherein the 4-position protecting group added in step 3 is a R- group selected from the group consisting of

(i) - H, -methyl, or a formyl derivative;

(ii) a C1-n alkyl, both straight chain and branched, wherein n is an integer between 1 and 20;

(iii) a substituted alkyl group;

(iv) phenyl and substituted phenyl: e.g., phenyl, p-nitrophenyl; and

(v) an R'O- group, forming a carbonate protecting group, wherein R' is any group of (i), (ii), (iii) or (iv).

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35. The method of claim 34, wherein the substituted alkyl group comprises a chloroacetyl, a trichloroacetyl, a trifluoroacetyl, a methoxyacetyl, a phenylacetyl, a 4-oxopentyl (levulinate) or an equivalent thereof.

36. The method of claim 34, wherein the carbonate protecting group comprises tBuOCO, PhOCO, $PhCH_2OCO$ or an equivalent thereof.

37. A kit comprising reagents and at least one hydrolase enzyme for practicing the methods of claim 1, claim 2 or claim 5.

38. The kit of claim 37, wherein the at least one hydrolase enzyme has a sequence having at least about 50%, 51%, 52%, 53%, 54%, 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more, or complete (100%) sequence identity to SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6, or enzymatically active fragments thereof.

39. A method for preparing simvastatin comprising a five-step heterodiacylation process having the following steps:

(a) enzymatic hydrolysis of lovastatin, lovastatin acid or a salt of lovastatin acid to form a triol acid or a salt of a triol acid;

(b) lactonization of the triol acid to form a diol lactone;

(c) protecting the hydroxyl at the 4-position (4'-OH) on the lactone ring of the diol lactone by enzymatic regioselective acylation of the 4'-OH to form a 4-acyl lactone;

(d) acylating the hydroxyl at the 8-position (8'-OH) of the 4-acyl lactone by enzymatic regioselective acylation of the 8-position to form a 4-acyl simvastatin; and

(e) removing selectively the acyl protecting group at the 4' position either chemically or enzymatically, thereby yielding simvastatin.

40. The method of claim 39, wherein in step (b) the lactonization of the triol acid to form a diol lactone comprises heating the triol acid or stirring in the presence of acid to form a diol lactone.